

APS Launches Boost-Phase Missile Defense Study

As President George W. Bush renewed the call on 1 May for a national missile defense, pushing the controversial issue once again to the forefront of the news, a panel under the auspices of the American Physical Society was about to begin an unclassified study of the “boost-phase” option for such a system. The goal of the APS study is to look at the fundamental physics and engineering involved in using an interceptor missile or airborne laser to shoot down a threatening missile as it is rocketing into space.

The study, scheduled to be completed and ready for release by the end of February 2002, is the first APS public policy study since the influential, and somewhat infamous, DEW (Directed Energy Weapons) report in April 1987. That report relied on classified material and was highly regarded, but took years to complete and publish. By the time the report was published, the DEW system was no longer being considered for Ronald Reagan’s “Star Wars” system.

The boost-phase study will be conducted by a 14-member group of physicists and engineers, many with specific expertise in the technologies relevant to an anti-missile system. Unlike the DEW report, the boost-phase study will not depend on classified material, which means it can be done quickly and without the government classification reviews that often lead to delays, said University of Illinois physicist Frederick Lamb, who is cochairing the study with MIT’s Daniel Kleppner.

In June 2000, the APS council issued a statement on missile defense that said, in part, that the “United States should not make a deployment decision relative to the planned National Missile Defense (NMD) system unless that system is shown—through analysis and through intercept tests—to be effective against the types of offensive countermeasures that an attacker could reasonably be expected to deploy with its long-range missiles.”

The statement was fine, Lamb said, but there was sentiment among the APS leadership that more was needed. The physicists considered the studies being done by other organizations on the feasibility of a missile system based on “mid-course intercept,” that is, hitting the warheads after they have separated from their booster rockets and are in space. They felt

a study looking at other technical issues, such as the increasingly important boost-phase intercept possibility, would be more helpful to the national debate.

An advisory group that included Lamb, current APS president George Trilling, past president James Langer, and others, concluded that a boost-phase study done in less than a year would be more useful than a DEW-type study that would take much longer to complete. The group also recommended that the boost-phase study should be the first in a sequence of short-time-frame studies and that it could establish a “new model for how APS addresses large and complex technical issues with important political and policy implications.”

A scientific analysis of the boost-phase option in missile defense would be valuable, Lamb said, “because boost-phase systems are still at the conceptual stage. There is no program and there is no architecture. Many of the technological questions have not been answered, but it is a focus of intense interest because the new administration is pushing it.” The study won’t attempt to answer whether such a system could be built, Lamb said. “That is impossible to address until you have defined a system.”

Instead, he said, the study will look at such things as what kinds of missiles might pose a threat. The study group will then figure out what characteristics an interceptor missile or airborne laser would have to have to be able to destroy a hostile missile within the roughly 200 seconds of boost phase.

Other questions abound. If you destroy a hostile missile late in its boost phase, will the warhead hit Canada instead of the US? If you want to destroy the warhead directly, how much improved does the interceptor have to be? And given that the boost phase lasts only about 200 seconds, is there time to consult with the president before firing the interceptor or laser? Indeed, is there time for a human to be involved at all?

APS Executive Officer Judy Franz said that selection of the study group members is almost complete and the first meeting has been scheduled for mid-July. Proposals for funding of a few hundred thousand dollars have been submitted to several foundations, and APS has agreed to supplement that money, if needed.

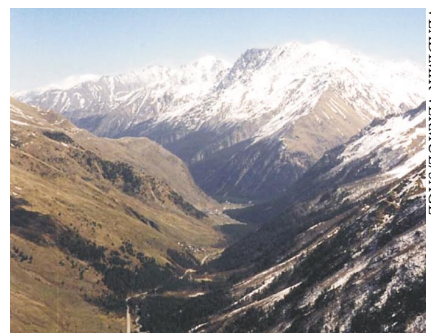
JIM DAWSON

SAGE Fends Off Gallium Raid

The Russian-American Gallium Experiment (SAGE) has survived yet another raid. Over the past few years, common thieves and government officials alike have repeatedly tried to grab some of SAGE’s 60 tons of gallium—which goes for about \$500 a kilogram on the world market (see PHYSICS TODAY, June 1997, page 73 and August 1998, page 55). Most recently, in February, policemen and chemists showed up unannounced at the SAGE site in Russia’s Caucasus Mountains; they implied that the scientists were illicitly selling off the state-owned gallium for personal gain and demanded to conduct an inventory.

Most of the SAGE gallium is in seven-ton vats, forming a target for low-energy solar neutrinos, which are recorded by extracting and counting radioactive germanium atoms produced by neutrino interactions. In taking stock of the gallium, “[the auditors said] maybe your calibration [of the vat volume] is wrong. They put water into an empty tank, did the calibrations again, and the curves lay on top of each other,” says Jeff Nico, a physicist at NIST who was there during the surprise audit. The police and chemists went so far as to suggest that the vats had false bottoms to cover for missing gallium. But after making spot measurements for about 10 days, they left without any evidence that gallium was missing.

Such attacks have their roots in greed and in a murky deal: About four years ago the government issued a decree to sell the gallium, says SAGE director Vladimir Gavrin. Thanks to protests by scientists in Russia and abroad, the SAGE gallium remains intact, but seven tons of it—for which a private chemical plant paid only a third of the market value—are still in dispute. The chemical plant keeps try-



VLADIMIR VERMUL/SAGE

THE SAGE SOLAR NEUTRINO detector is nestled underground in the Caucasus Mountains in southern Russia.